OMNI Continental

ProNamics Control Inc.

Process Control and Optimization of Energy, Steam and Combustion Systems

April 24 - 28, 2006

North Vancouver, BC

With energy costs rising, steam production has become a major cost center for the manufacturing industry. To improve profitability, plants have reduced the amount of vented or condensed steam and have reduced the number of boilers in operation. Although closing the steam system improves the energy efficiency of a plant it also increases the variation in steam quality, leading to potential product quality or process operation issues. It is often possible to substantially improve steam system stability through control strategy improvements and optimized tuning The *Control and Optimization of Energy, Steam and Combustion systems* course explains the different control strategies and process dynamics found in a typical steam plant.

COURSE TOPICS:

Steam System Thermodynamics
Steam Plant Design and Controllability
Combustion Dynamics and Control
Plant Master Design and Control
Drum Level Dynamics and tuning
Steam Pressure and Temperature Control
Steam Turbine Controls
Co-generation challenges

COURSE DESCRIPTION

The overall objective of this 4-1/2 day course is to show how to make the steam system more integrated, more responsive, more robust and more energy efficient. The course begins with a review of thermodynamic principles and Lambda tuning procedures. The application of advanced control strategies to improve system stability are a primary focus. Topics include cross limiting, shrink-swell effects, design and tuning of the plant master controller, and the control challenges of co-generation. Approximately 30% of the course is devoted to a computer-based lab that illustrates the main concepts.

INSTRUCTORS

Ben Janvier, M.Eng, P.Eng. is the principal consultant at **Enero Solutions**. He has over 8 years of steam plant optimization experience that includes on-site troubleshooting, control strategy optimization, training and simulation development.
Doug Nelson, P.Eng. of **ProNamics Control Inc** has over 23 years of pulp and paper process control experience in process control optimization. He is a member of the Association of Energy Engineers.

WHO SHOULD ATTEND

The course is primarily intended for process engineers, control engineers or instrumentation engineers who have responsibility over the optimization of boilers, furnaces, power plants or steam plants. The course explores the implications of process equipment design and process variability and therefore would be beneficial for maintenance and design engineers.

COURSE LOCATION

The course will be held at the Lonsdale Quay Hotel, 123 Carrie Cates Court, North Vancouver, BC V7M 3K7 (Phone (604) 986-6111). Attendees are responsible for arranging their own accommodations.

REGISTRATION

Registration fee is $2200 CDN ($2354GST included) or $2000 US for the 4-1/2day course. Attendees need to register 3 weeks in advance to ensure space and materials will be available. ProNamics reserves the right to cancel the course based on a minimum number of registrants. The course is limited to 12 participants.

COURSE SCHEDULE

Day One

Introduction **Boiler Course Overview**
8:00-9:30

Lecture 1 **Applied Thermodynamics**
09:30 - 11:00

Lecture 2 **Steam System Thermodynamics**
11:00 - 12:00 Impact on steam plant stability

Lab 1 **Steam System Thermodynamics**
1:00 - 2:00

Lecture 3 **Fundamentals of Lambda Tuning**
2:00 - 4:00

Lab 2 **Lambda Tuning Lab**
4:00-5:00 Application to steam system control loops

Day Two

Lecture 4 **Advanced Control Overview**
8:00-10:00 Feedforward, cascade, mid range, split range, ratio control in the steam plant

Lecture 5 **Applied Heat Transfer**
10:00 - 11:00

Lecture 6 **Combustion Dynamics and Controls**
11:00 - 2:00 Cross limiting strategy, $\%O_2$ controls

Lab 3 **Combustion Controls Lab**
2:00 - 3:30

Lecture 7 **Furnace Draft Control**
3:30 - 4:30 Dynamics, interactions, tuning strategy

Day Three

Lecture 8 **Plant Master Design, Control, Tuning**
8:00 - 10:00

Day Three

Lab 4 **Plant Master Design and Tuning**
10:00 - 11:00

Lecture 9 **Boiler Drum Level Control**
11:00 - 2:30 Process dynamics, tuning, control strategies

Lab 5 **Boiler Drum Level Control**
2:30 - 4:30 Control Strategy Options, tuning

Day Four

Lecture 10 **Pressure Control of Multi-Header Systems**
8:00 - 9:30

Lab 6 **Multi Header Pressure Control**
9:30 - 10:30

Lecture 11 **Steam Temperature Control**
10:30 - 12:00 Desuperheaters, dynamics, tuning

Lab 7 **Steam Temperature Control**
1:00 - 2:00

Lecture 12 **Steam Turbine Controls**
2:00 - 3:00

Lecture 13 **Power Generation and Cogeneration**
3:00-4:30

Day Five

Lecture 14 **Energy System Troubleshooting**
8:00-9:00

Lab /Seminar **Class Examples / Wrap-Up**
9:00—12:00

Lunch Breaks between 12:00 & 1:00 each day

ABOUT Enero / ProNamics

Enero Solutions Inc. is a Montreal based energy consulting company that specializes in process dynamics and control with a focus on steam system optimization. The companies services include training, steam system optimization surveys, and simulation development. ***ProNamics Control Inc.*** is a Vancouver based pulp and paper process control consulting company. The company conducts process and control optimization field surveys, prepares process simulations to establish best practices and provides a range of training courses related to process control optimization.

REGISTRATION FORM / CONTACT US: Fax to OMNI at 604-925-9311

Name: _____ Position: _____

Company: _____ Email: _____

Address: _____

_____

Phone: _____ Fax: _____

Payment: ❒ Full Payment Enclosed ❒ Invoice my company ❒ Charge my AMEX Credit Card

Card Number: _____ Expiry Date: _____

Name Of Cardholder: _____

Signature: _____ Date: _____

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